

„Let me subscribe“ Zabbix masters IoT Topics



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„Let me subscribe“ What is this all about



ZABBIX FEATURE REQUESTS / ZBXNEXT-3950 Provide MQTT as item type


▼ Dates

Created:

2017 Jun 21 12:48

▼ Details

Type:

 New Feature
Request

Status:

CLOSED

Priority:

 Trivial

Resolution:

Fixed

<https://support.zabbix.com/browse/ZBXNEXT-3950>

For „Modbus“ support, see also:

<https://support.zabbix.com/browse/ZBXNEXT-6090>

<https://support.zabbix.com/browse/ZBXNEXT-6093>

„Let me subscribe“
What is this all about



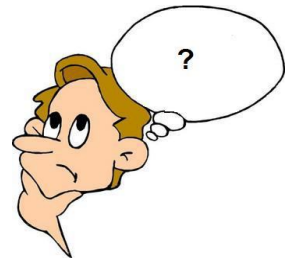
Cool, but what is MQTT?

„Let me subscribe“

MQTT basics



- MQTT = „Message Queuing Telemetry Transport“.
- Invented in 1999, designed to be bandwidth-efficient and lightweight, thus battery efficient.
- ISO standard: ISO/IEC 20922. (<https://www.iso.org/standard/69466.html>)
- Rapidly increasing adoption because of its suitability for Internet of Things (IoT), sensor networks, home automation, machine-to-machine (M2M) and mobile applications.
- Usually runs over TCP/IP, Ports 1883 / 8883 (encrypted).
- Encryption requires TLS transport.



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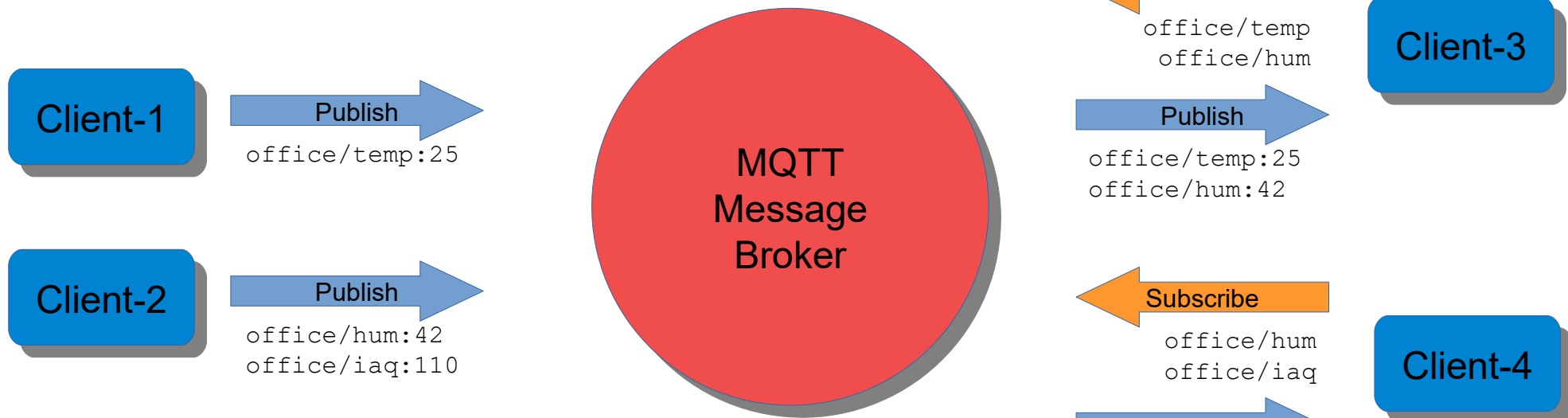
MQTT basics



- Variation MQTT-SN (MQTT for Sensor Networks):
Variant for non-TCP/IP networks like Zigbee (IEEE 80215.4 radio based protocol) or other UDP / Bluetooth based implementations.
- Based on a „publish“ / „subscribe“ to „topic“ mechanism.
- 2 types of network entities: „Message broker“ and „Clients“.
- Supports 3 QoS levels:
 - 0: At most once – „Fire and forget“.
 - 1: At least once – Could be sent/delivered multiple times.
 - 2: Exactly once – Safest and slowest service.



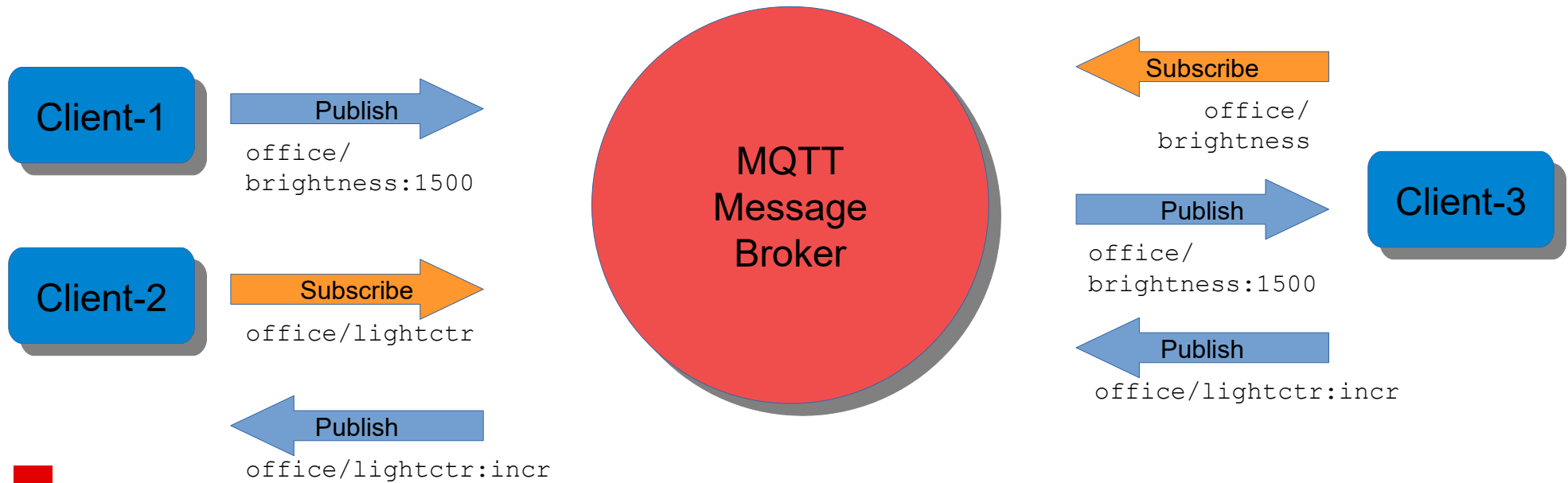
„Let me subscribe“ Publish / subscribe



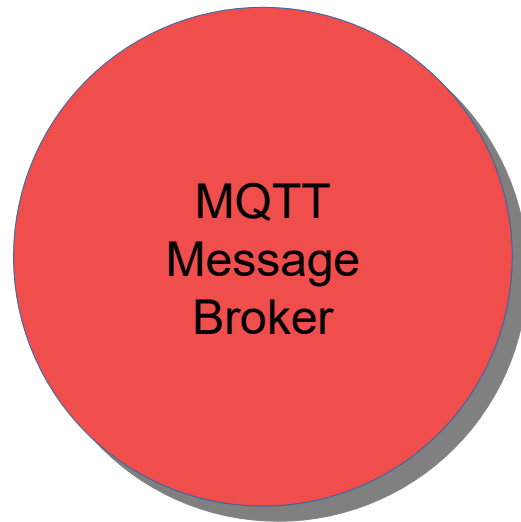
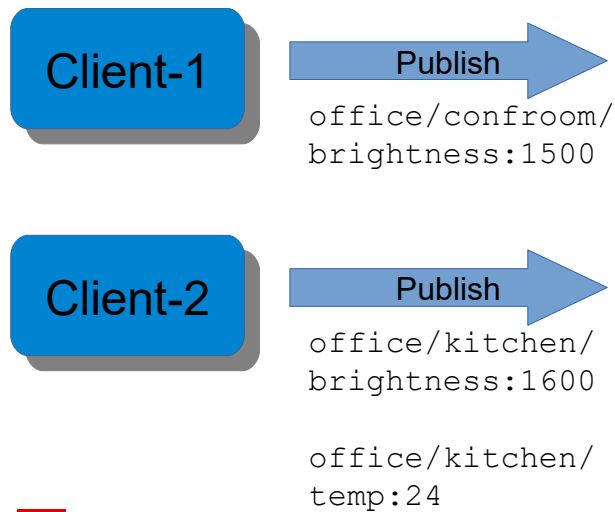
Topic 1 (2 levels): `office/temp`
Topic 2 (2 levels): `office/hum`



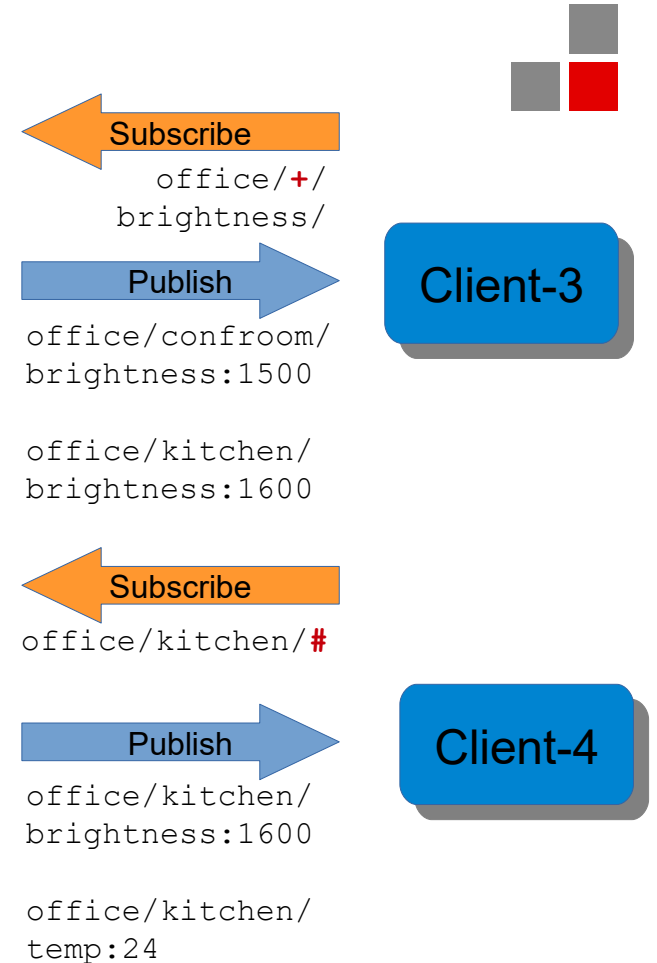
„Let me subscribe“ Combined pub/sub



„Let me subscribe“ Wildcards subs



+ = single level
= multi level



„Let me subscribe“

MQTT - Summary



- Clients can publish and subscribe to one or more topics.
- One client can publish and subscribe at the same time.
- Clients can subscribe using single/multi level wildcards.
- Clients can choose between three different QoS levels.

Advanced features:

- Messages can be retained on the broker for new subscribers.
- Clients can provide a “last will and testament” that will be published by the broker when the client “dies”.



„Let me subscribe“
What is this all about



Ok, but where does
Zabbix come into play?

„Let me subscribe“

Real world example – Simple Setup



Server Room

Training Room



office/bielefeld/serverroom
office/bielefeld/trainingroom

Published Topics

office/bielefeld/salesroom
office/bielefeld/supportroom



Sales Room

Support Room



Publish

Subscribe



Home
Automation

mosquitto: <https://mosquitto.org/>



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„Let me subscribe“ Real world example – Simple Setup

Server Room

Training Room



office/bielefeld/serverroom
office/bielefeld/trainingroom

Published Topics

office/bielefeld/salesroom
office/bielefeld/supportroom



Sales Room

Support Room



Publish

Subscribe



Zabbix 5.2 Agent 2

Zabbix as a subscriber



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„Let me subscribe“

Real world example – Simple Setup

Server Room



Training Room



office/bielefeld/serverroom
office/bielefeld/trainingroom

Published Topics

office/bielefeld/salesroom
office/bielefeld/supportroom



Sales Room

Support Room



Publish

Multiple clients

Subscribe



Zabbix 5.2 Agent 2

Subscribe



Home Automation



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„Let me subscribe“ Real world example – Flow handling

Server Room

Training Room



office/bielefeld/serverroom
office/bielefeld/trainingroom

Published Topics

office/bielefeld/salesroom
office/bielefeld/supportroom

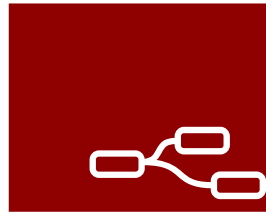


Sales Room

Support Room



MQTT
Message Broker



Node-RED

Flow-based
programming tool



Zabbix 5.2 Agent 2



Home
Automation

Publish

Subscribe

Subscribe

Publish

Subscribe

Data Processing in Node-RED

„Let me subscribe“

Real world example – Flow handling

Server Room

Training Room



office/bielefeld/serverroom
office/bielefeld/trainingroom

Published Topics

office/bielefeld/salesroom
office/bielefeld/supportroom

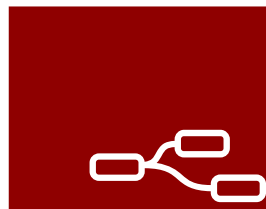


Sales Room

Support Room



MQTT
Message Broker



Node-RED

Flow-based
programming tool



Zabbix 5.2 Agent 2



Home
Automation

Publish

Subscribe

Subscribe

Publish

Subscribe

Publish

Zabbix publishes data to broker



„Let me subscribe“ Real world example – Flow handling

Server Room



Training Room



office/bielefeld/serverroom
office/bielefeld/trainingroom

Published Topics

office/bielefeld/salesroom
office/bielefeld/supportroom

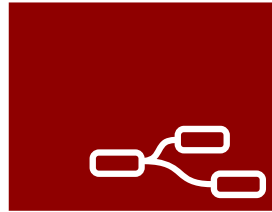


Sales Room

Support Room



MQTT
Message Broker



Node-RED

Flow-based
programming tool



Zabbix 5.2 Agent 2



Zabbix 5.2 Agent 2

Publish

Subscribe

Subscribe

Subscribe

Publish

Multiple Zabbix servers share same data



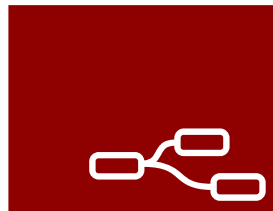
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What is Node-RED?



- Construction kit for the Internet of Things and home automation.
- Acts as MQTT client, can publish and subscribe.
- Flow-based tool for visual programming based on Node.js.
- Graphical web editor.
- Supports input, processing and output nodes.
- Extensible with plugins and custom function nodes.



Node-RED



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„Let me subscribe“ Node-RED – Simple Subscription



The screenshot shows the Node-RED web interface. On the left, the 'common' nodes palette is visible, including 'inject', 'debug', 'complete', 'catch', 'status', 'link in', 'link out', and 'comment'. The 'function' nodes palette includes 'function', 'switch', and 'change'. The main workspace shows a flow named 'Flow 1' with the following nodes connected in sequence:

- An MQTT subscriber node labeled 'office/bielefeld/#' with a 'connected' status indicator.
- A 'temperature' node (yellow) that filters the message.
- A 'msg.payload' node (green) that outputs the filtered payload.
- An 'RSSI' node (yellow) that filters the message.
- A 'smooth' node (yellow) that smooths the RSSI values.
- A 'log' node (orange) that writes the smoothed RSSI values to the file '/var/log/rssi.log'.

On the right side, the 'debug' console shows a log entry:

```
8.10.2020, 12:04:04 node: 5d3150af.504a08  
office/bielefeld/supportroom : msg.payload : number  
22.69
```

Node-RED: <https://nodered.org/>

„Let me subscribe“ Sensor data



Raw JSON string

Topic: office/bielefeld/salesroom QoS: 0

```
{ "hasenv":1, "hasiaq":1, "hastempe":0, "temp":20.71, "hum":47.12793, "dew":9.490333, "press":99869.12, "eco2":1294, "tvoc":136, "rssi":-77, "vcc":4.235063, "batterycharge":100, "serial":"040B0BBF713C", "version":"1.5.0", "enverror":0, "iaqerror":0, "iaqerrorstatus":0, "iaqheatingtime":1200, "iaqbaseline":38007, "iaqdisabled":0, "tempeerror":0, "sfails":0, "wfails":0, "cfails":0, "tfails":0, "wctime":3.174, "sctime":0, "rreason":5, "wareason":4, "interval":10, "location":"Sales Room", "contact":"IntelliTrend Monitoring Team", "geolatitude":"52.013798", "geolongitude":"8.565642", "devicetype":"IMS-Smart", "otaconfigstatus":0, "otaconfiginterval":24, "otafwstatus":0, "otafwinterval":168}
```

2020-10-08 13:23:19

Parsed JSON object

```
debug
8.10.2020, 13:23:19 node: 8ded3391.d9ccf
office/bielefeld/salesroom : msg.payload : Object
object
  hasenv: 1
  hasiaq: 1
  hastempe: 0
  temp: 20.71
  hum: 47.12793
  dew: 9.490333
  press: 99869.12
  eco2: 1294
  tvoc: 136
  rssi: -77
  vcc: 4.235063
  batterycharge: 100
  serial: "040B0BBF713C"
  version: "1.5.0"
  enverror: 0
  iaqerror: 0
  iaqerrorstatus: 0
  iaqheatingtime: 1200
  iaqbaseline: 38007
  iaqdisabled: 0
  tempeerror: 0
  sfails: 0
  wfails: 0
  cfails: 0
  tfails: 0
  wctime: 3.174
  sctime: 0
  rreason: 5
  wareason: 4
  interval: 10
  location: "Sales Room"
  contact: "IntelliTrend Monitoring Team"
  geolatitude: "52.013798"
  geolongitude: "8.565642"
  devicetype: "IMS-Smart"
  otaconfigstatus: 0
  otaconfiginterval: 24
  otafwstatus: 0
  otafwinterval: 168
```



Multiple metrics in one message

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„Let me subscribe“

Options to process multiple metrics



```
2.10.2020, 14:22:55 node: 97235674.a4356
imssmart : msg.payload : Object
▼ object
  dew: 11.83546
  hasenv: 1
  hasiaq: 1
  hastempe: 1
  hum: 40.29004
  eco2: 400
  tvoc: 0
  press: 98317.3
  rssi: -52
  temp: 24.91
  tempe: 24.9375
  vcc: 4.099594
  batterycharge: 94
  serial: "043A9BC40A24"
  version: "1.5.0"
```

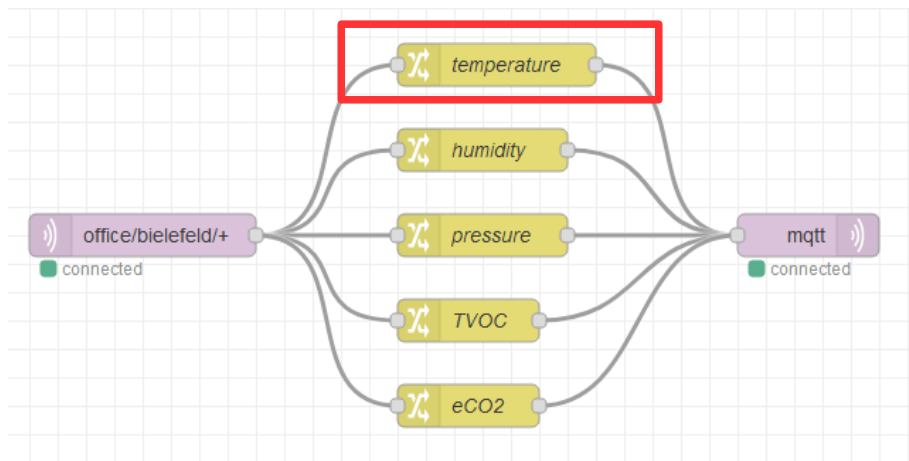
- Split on MQTT level:
Use Node-RED to split metrics and then publish them in their own topics. Good if there are other clients that can handle only a single metric at a time.
- Split on Zabbix level:
Use Zabbix JSON pre-processing with corresponding dependant items. Zabbix would just need one subscription.
- Combine both methods:
Let other clients subscribe to a single metric using their specific topic, but also publish all sensor data for Zabbix in one topic.



„Let me subscribe“ Split metrics on MQTT level



Node setup



- Using JSONata expressions to extract metrics.
- Append sensor name to original topic.
- Publish to new topic in node message.

Node properties (temperature)

Debug output

Splitting data in Node-RED



„Let me subscribe“ Implementation



Zabbix side of things ...

„Let me subscribe“

How to use the new MQTT key



```
mqtt.get[<broker_url>,topic,<username>,<password>]
```

- Requires Agent 2.
- Requires active checks.
- Broker URL default is localhost.
- User name and password are optional.
- Uses Eclipse Paho Go client library.

„Let me subscribe“ Agent active - send to multiple hosts



One Zabbix agent **active** needs to send data to **multiple** hosts ...



Zabbix 5.2 Agent 2



office/bielefeld/salesroom
office/bielefeld/serverroom
office/bielefeld/supportroom
office/bielefeld/trainingroom

im.ims-040B0BBF713C
im.ims-603E9BC40A24
im.ims-80D478BF713C
im.ims-94B71112CFA4



Zabbix 5.2 Server

```
Hostname=im.ims-040B0BBF713C,im.ims-603E9BC40A24,im.ims-80D478BF713C,im.ims-94B71112CFA4
```



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ZABBIX FEATURE REQUESTS / ZBXNEXT-2943

Running active agent checks from multiple Zabbix hosts

„Let me subscribe“ Split metrics on Zabbix level



Master Item

* Name

Type

* Key

Type of information

* Update interval

Custom intervals

Type	Interval	Period	Action
Flexible Scheduling	50s	1-7,00:00-24:00	Remove

[Add](#)

Dependent Item

* Name

Type

* Key

* Master item

Type of information

Units

Dependent Item Preprocessing

Preprocessing steps	Name	Parameters	Custom on fail	Actions
1:	<input type="text" value="JSONPath"/>	<input type="text" value="\$temp"/>	<input type="checkbox"/>	Test Remove

[Add](#)

[Test all steps](#)



„Let me subscribe“

Master item and dependent items

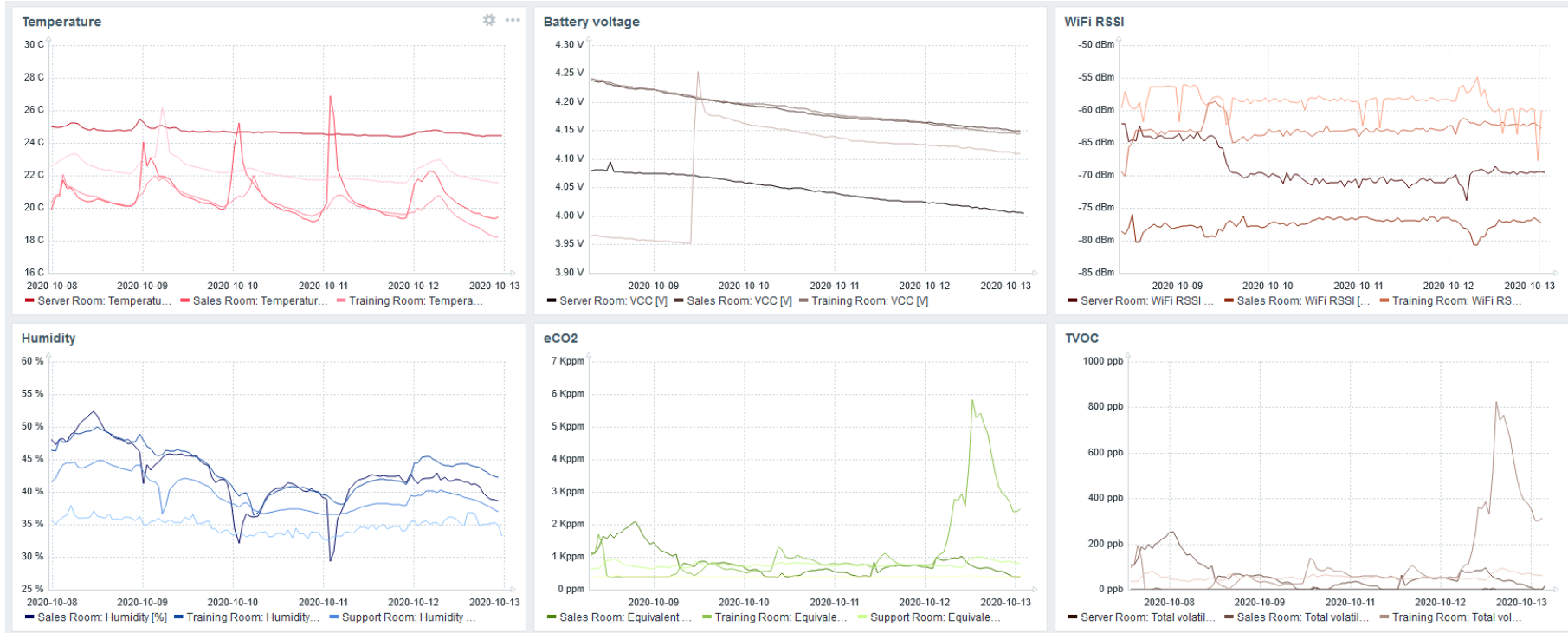


<input type="checkbox"/>	Wizard	Name ▲	Triggers	Key	Interval	History	Trends	Type	Applications	Status	Info
<input type="checkbox"/>	...	IMS-Smart Sensor MQTT: Sensor data master: Air pressure [Pa]		press	180d	365d		Dependent item	Sensor data	Enabled	
<input type="checkbox"/>	...	IMS-Smart Sensor MQTT: Sensor data master: Battery charge [%]	Triggers 3	batterycharge	180d	365d		Dependent item	Sensor data	Enabled	
<input type="checkbox"/>	...	IMS-Smart Sensor MQTT: Sensor data master: Dew point [C]	Triggers 2	dew	90d	365d		Dependent item	Sensor data	Enabled	
<input type="checkbox"/>	...	IMS-Smart Sensor MQTT: Sensor data master: Equivalent carbon-dioxide eCO2 [ppm]		eco2	90d	365d		Dependent item	Sensor data	Enabled	
<input type="checkbox"/>	...	IMS-Smart Sensor MQTT: Sensor data master: Humidity [%]		hum	90d	365d		Dependent item	Sensor data	Enabled	
<input type="checkbox"/>	...	IMS-Smart Sensor MQTT: Sensor data master: IAQ baseline		iaqbaseline	90d	365d		Dependent item	Sensor data	Enabled	
<input type="checkbox"/>	...	IMS-Smart Sensor MQTT: Sensor data master: IAQ disabled [Status]		iaqdisabled	90d	365d		Dependent item	Sensor data	Enabled	
<input type="checkbox"/>	...	IMS-Smart Sensor MQTT: Sensor data master		mqtt.get({\$MQTT_BROKER},{MQTT_TOPIC},{MQTT_USER},{MQTT_PASS}]	90d			Zabbix agent (active)	Sensor data	Enabled	
<input type="checkbox"/>	...	IMS-Smart Sensor MQTT: Sensor data master: Temperature external [C]	Triggers 2	tempe	90d	365d		Dependent item	Sensor data	Enabled	
<input type="checkbox"/>	...	IMS-Smart Sensor MQTT: Sensor data master: Temperature [C]	Triggers 1	temp	90d	365d		Dependent item	Sensor data	Enabled	
<input type="checkbox"/>	...	IMS-Smart Sensor MQTT: Sensor data master: Total volatile organic compound TVOC [ppb]		tvoc	90d	365d		Dependent item	Sensor data	Enabled	
<input type="checkbox"/>	...	IMS-Smart Sensor MQTT: Sensor data master: VCC [V]	Triggers 1	vcc	90d	365d		Dependent item	Sensor data	Enabled	
<input type="checkbox"/>	...	IMS-Smart Sensor MQTT: Sensor data master: WiFi RSSI [dBm]	Triggers 1	rsi	90d	365d		Dependent item	Sensor data	Enabled	

Displaying 13 of 13 found



„Let me subscribe“ Sensor data dashboard



„Let me subscribe“ Publish from Zabbix



Bonus:

Publish the outcome of a Zabbix trigger,
so it can be consumed by other
MQTT based devices

„Let me subscribe“ Publish from Zabbix



Simple media type to send problems to the topic:

zabbix/problems/<user>

```
#!/bin/sh  
mosquitto_pub -h yourbroker.io -m "$1" -t "zabbix/problems/$2"
```

* Name

Type

* Script name

Script parameters

Parameter	Action
<input type="text" value="{ALERT.MESSAGE}"/>	Remove
<input type="text" value="{ALERT.SENDTO}"/>	Remove
Add	

Description

Enabled

[Update](#) [Clone](#) [Delete](#) [Cancel](#)

„Let me subscribe“ Publish from Zabbix



JSON problem template:

```
{  
  "type": "problem",  
  "start-date": "{EVENT.DATE}",  
  "start-time": "{EVENT.TIME}",  
  "name": "{EVENT.NAME}",  
  "host": "{HOST.NAME}",  
  "severity": "{EVENT.SEVERITY}",  
  "opdata": "{EVENT.OPDATA}",  
  "event-id": {EVENT.ID},  
  "trigger-url": "{TRIGGER.URL}"  
}
```

JSON problem recovery template:

```
{  
  "type": "recovery",  
  "recovery-date": "{EVENT.RECOVERY.DATE}",  
  "recovery-time": "{EVENT.RECOVERY.TIME}",  
  "name": "{EVENT.NAME}",  
  "duration": "{EVENT.DURATION}",  
  "host": "{HOST.NAME}",  
  "severity": "{EVENT.SEVERITY}",  
  "opdata": "{EVENT.OPDATA}",  
  "event-id": {EVENT.ID},  
  "trigger-url": "{TRIGGER.URL}"  
}
```



„Let me subscribe“ Publish from Zabbix



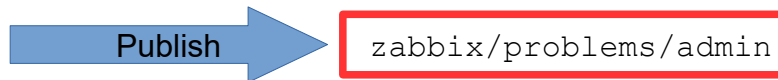
Zabbix problems are now published via MQTT.

Time	Severity	Recovery time	Status	Info	Host	Problem	Duration	Ack	Actions	Tags
17:06:36	Not classified		PROBLEM		Support Room	[Support Room] - Sensor: Bad air quality, open the window!	1m 40s	No	↕	Contact: IntelliTrend M... Location: Support Room Type: Sensor

Displaying 1 of 1 found



2020-10-09 17:06:40 MQTT report MQTT Admin (Zabbix Administrator) admin
Subject:
Problem: [Support Room] - Sensor: Bad air quality, open the window!
Message:
{\"type\":\"problem\",\"start-date\":\"2020.10.09\",\"start-time\":\"17:06:36\",\"name\":\"[Support Room] - Sensor: Bad air quality, open the window!\",\"host\":\"Support Room\",\"severity\":\"Not classified\",\"opdata\":\"906 ppm\",\"event-id\":4823,\"trigger-url\":\"\"}



```
Sent 9.10.2020, 17:06:41 node: 914f706.4d9391
zabbix/problems/admin : msg.payload : Object
▼ object
  type: "problem"
  start-date: "2020.10.09"
  start-time: "17:06:36"
  name: "[Support Room] - Sensor: Bad air quality, open the window!"
  host: "Support Room"
  severity: "Not classified"
  opdata: "906 ppm"
  event-id: 4823
  trigger-url: ""
```

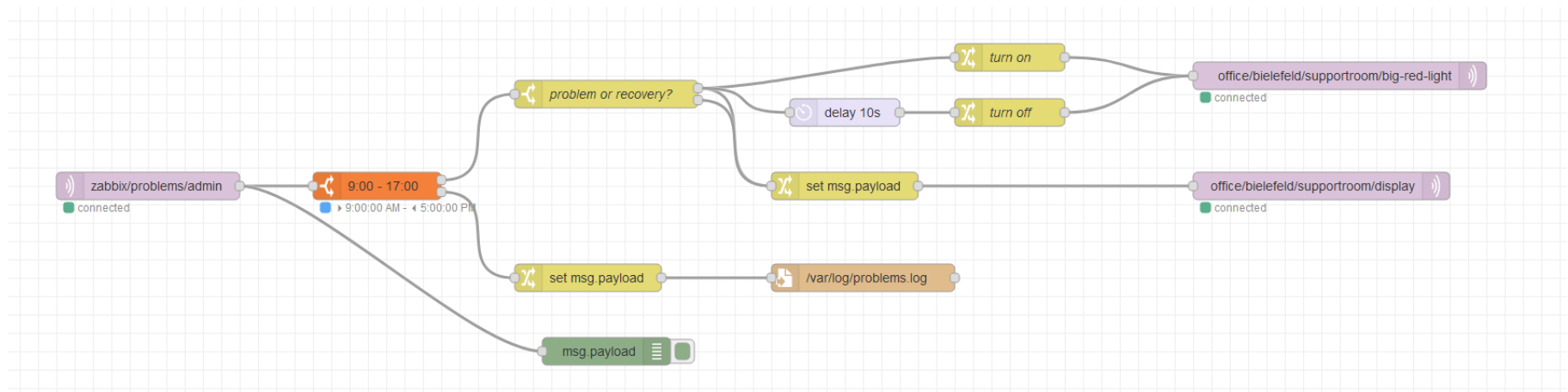
Any MQTT subscriber, like Node-RED, receives the alert.



„Let me subscribe“ Publish from Zabbix



IoT devices and other subscribers can react to issues detected by Zabbix using Node-RED!



„Let me subscribe“ Try it out – Live broker available



<https://github.com/intellitrend/zabbix-iot-mqtt>

intellitrend / zabbix-iot-mqtt

main 1 branch 0 tags

File	Commit Message	Time
images	[ADD] Added Zabbix templates, Host templates and README.md	29 minutes ago
templates	[ADD] Added Zabbix templates, Host templates and README.md	29 minutes ago
LICENSE	Initial commit	39 minutes ago
README.md	[ADD] Added Zabbix templates, Host templates and README.md	29 minutes ago

README.md

Zabbix MQTT demo setup from Zabbix Summit 2020

For details about the Zabbix summit and the talk see [Zabbix Summit 2020](#) and [Let me subscribe - Zabbix masters IoT Topics](#).

About this repository

This repository contains instructions and templates that allows to test out the new MQTT feature added to Zabbix 5.2, with real sensor data provided by the IntelliTrend IoT demonstration MQTT broker.



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„Let me subscribe“ Zabbix masters IoT Topics

Thank You!



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